

PINACEAE OF THE CHIHUAHUAN DESERT REGION

Dana K. Bailey
University of Colorado Museum
Boulder, Colorado 80309

and

Frank G. Hawksworth
USDA Forest Service
Rocky Mountain Forest and Range
Experiment Station, Colorado State University
Fort Collins, Colorado 80526

ABSTRACT

This abbreviated treatment of the Pinaceae, prepared for the Chihuahuan Desert Region flora, recognizes 15 taxa of Pinus and 1 each of Abies and Pseudotsuga. The Region is particularly rich in pinyons, with 8 taxa. The more detailed treatment will be presented in the flora of the Chihuahuan Desert Region being prepared under the direction of Dr. M. C. Johnston of the University of Texas.

A flora of the Chihuahuan Desert Region (CDR) of the United States and Mexico has been in preparation for some time under the leadership of Dr. Marshall C. Johnston of the Botany Department of the University of Texas, Austin. Because the conifers are such a visible part of the landscape of the area and because of their economic, ecological, and ethnobotanical importance, there is considerable interest in the group. Thus, we have been asked to release this abbreviated taxonomic treatment in advance of the publication of the entire flora. This Pinaceae treatment will be revised and expanded (with addition of family and generic descriptions and keys) for later publication in the flora. Comments on this treatment would be appreciated.

The area covered by the CDR encompasses over 500,000 square kilometers and ranges from southern New Mexico and west Texas south through Chihuahua (most northern and eastern parts), Coahuila (most of state except northeast), northeastern Durango, southwestern Tamaulipas, northern Zacatecas, and western San Luis Potosí (map in Johnston, 1977). The mountain ranges within the area are included in the flora, but not the adjacent higher ranges where several additional members of the Pinaceae occur. Thus to the east

are found Abies vejarii Martínez, Picea engelmannii Parry subsp. mexicana (Martínez) Taylor & Patterson (= P. mexicana Martínez), Pinus culminicola Andresen & Beaman, P. greggii Engelm., P. estevezii (Martínez) Perry, P. montezumae Lamb., P. pseudostrobus Lindl., and P. rudis Lindl.; to the west Pinus cooperi C. E. Blanco, P. durangensis Martínez, and P. lumholtzii Robins. & Fern., and to the north in New Mexico, Abies concolor (Gord. & Glend.) Lindl. ex Hildebr., A. lasiocarpa (Hook.) Nutt. and Picea engelmannii Parry subsp. engelmannii. It may be noted that no Pinaceae in addition to those listed above and those known within the CDR are found in New Mexico or Arizona south of latitude 35° N, in Trans-Pecos Texas, or in Sonora or western Chihuahua north of about latitude 29° N.

The pines are by far the most abundant conifers in the CDR, and have been the most intensively investigated (Bailey and Hawksworth, 1979; Bailey and Wendt, 1979; Martínez, 1948; Robert, 1978; Robert-Passini, 1981). We recognize 13 species and 7 varieties for a total of fifteen taxa. The area is particularly rich in pinyons, with 8 taxa. Abies and Pseudotsuga are relatively rare in the CDR (one taxon each) and occur only in the mesic sites of a few of the higher mountain ranges.

I. PINUS L. PINE, PINOS

Subgenus Strobus

1. P. STROBIFORMIS Engelm. [P. ayacahuite Ehrenb. in part; P. flexilis var. reflexa Engelm.; P. reflexa (Engelm.) Engelm.] SOUTHWESTERN WHITE PINE, AYARIN, PINO NAYAR. Tree 20--30 m tall, trunk-diam. 0.4--1 m; twigs flexible, glabrous with glaucous bloom. Fascicles 5-lvd.; lvs. green to bluish green, slender 6--10 cm long, somewhat glaucous beneath, margins remotely serrulate. Seed cones when nearly ripe clear green or dark purple, 15--25 cm long; unarmed terminal umbos projecting at ca. right angle to cone-axis; seed cones when newly open varying from pale yellowish tan to dark purplish brown, 7--9 cm wide, with scales usually highly reflexed esp. lower scales, resinous; penduncles 1.5--2.5 cm long ca. flexible allowing cones to become somewhat pendent as they approach maturity; seeds ca. 1 cm long usually with wing reduced to narrow collar, but occasionally with short wings up to ca. 1 cm long. In mesic mts. above ca. 2200 m, Ariz., N.M., and w. Tex. s. to s. Dgo., Zac., and S.L.P.

2. P. PINCEANA Gord. [P. latisquama Engelm.]. WEEPING PINYON. Tree 6--12 m tall; trunk-diam. 0.2--0.5 m; much branched with rounded crown; branches long, slender, pendent with ashy gray bark remaining smooth for several years. Fascicles almost all 3-lvd.; lvs. pale green, slender, margins entire, 4--10 cm long, position of dorsal stomata variable: throughout length of needles in south but only at the needle tips in the north; resin ducts 2; seed cones

when nearly ripe greenish yellow with dark umbos, 6--10 cm long; seed cones when newly open ovoid, rich cinnamon-brown, lustrous, umbo slightly depressed with minute appressed prickle, non-resinous; peduncles 1--2 cm long, slender, allowing cones to become pendent; seeds ca. 1.2 cm long, wingless but with fine collar separating seed meridionally, with 1 side dark brown, 1 pale brown. Local pinyon found on dry mt.-slopes ca. 1800--2700 m, Coah., Zac., S.L.P., Qro., and Hgo.

3. P. JOHANNIS M.-F. Robert. Multi-stemmed shrub or small tree 2--6 m tall; winter buds subcylindric with fine long-tapering scales. Most fascicles 3-lvd., but 4s and even 5s occasionally found; lvs. dark green dorsally, ventrally somewhat glaucous, margins entire, little resinous, 3.5--6 cm long, mid-fascicle width 1.3--1.7 mm, stomatal rows absent on dorsal surface, resin ducts 2, fascicle sheaths on youngest mature needles highly reflexed (often more than 270°) forming a conspicuous rosette at base of fascicle. Seed cones 2.5--4 cm long, 3--5 cm wide, greenish gray to chestnut; peduncles 3--8 mm long; umbo unarmed, ca. 1/4 width of apophysis and often slightly recessed; seed shells 0.5--1 mm thick. Originally described from mts. just w. of Concepción del Oro, Zac., but also in the cloud zone of some higher mts. of Coah. and S. M. Or.

4. P. DISCOLOR Bailey & Hawsw. [P. cembroides var. bicolor Little] BORDER PINYON. Tree 5--12 m tall; trunk diam. 0.2--0.8 m; crown spreading, rounded; winter buds subcylindric with long-tapering scales, tips reddish, sometimes reflexed. Most fascicles 3-lvd., but 4s and even 5s occasionally found; lvs. dorsally dark green, ventrally extremely glaucous, virtually white, margins entire, little resinous, 3--6 cm long, mid-fascicles 1.3--1.6 mm wide; stomatal rows absent on dorsal surface, resin ducts 2 (--1); sheaths on youngest mature fascicles highly reflexed (often more than 270°) forming a conspicuous rosette at base of fascicle. Seed cones when open 2--3 cm long, 2.5--4 cm wide, peduncles 3--6 mm long, rather fine, apophyses when dry varying from lustrous yellowish to rich reddish brown, protuberant, umbos small and often slightly recessed; seed shells 0.5--1.2 mm thick. 1300--2700 m, mainly in mts., se. Ariz., sw. N.M., ne. Son., and nw. Chih., but isolated small pops. (mostly above 2500 m), s. Chih., Dgo., and S.L.P. P. discolor appears to be unique in Pinus in being nearly dioecious; female trees tend to predominate, esp. at n.-most locs.

5. P. CEMBROIDES Zucc. [P. llaveana Schiede; P. osteosperma Engelm.] MEXICAN PINYON, PINONERO. Tree 5--12 m tall, trunk-diam. 0.2--0.8 m; crown often spreading, rounded; winter buds subcylindric with fine long-tapering scales sometimes with reflexed tips. On same tree some fascicles 3- some 2-lvd.; lvs. dark green dorsally, ventrally variable glaucous, margins entire, little resinous, 3--6.5 cm long, mid-fascicle width 1.2--1.6 mm; stomatal rows present on all

surfaces, though usually fewer on dorsal surface, resin ducts 2 (--1); fascicle sheath on youngest mature needles highly reflexed (often more than 270°) forming a conspicuous rosette at base of fascicle. Seed cones when newly open varying from rich reddish brown to yellowish brown, globose or subglobose, at base often flattened; axis 2.5--4 cm long, 3--5.5 cm wide, peduncles 2--5 mm long, scales relatively few, apophyses when dry reddish brown, wrinkled; umbos protuberant, ca. half width of apophyses; seeds wingless, ca. 1.4 cm long, moderately pointed at proximal end, dark brown to black, sometimes mottled; seed shells 0.4--1.0 mm thick, ca. dry locs. in open stands, 1450--2700 m, w. Tex., Chih., s. to cent. Mex., and s. Baja C. Common Mex. nut pine; seeds much used for food, 2 vars.: var. lagunae Robert-Passini, s. Baja C., and

5a. P. cembroides var. cembroides, w. Tex, Chih, s. to cent. Mex.

6. P. REMOTA (Little) Bailey & Hawksw. [P. cembroides var. remota Little, P. caterinae Robert-Passini]. PAPER-SHELL PINYON. Tree or shrub 4--7 m tall, trunk diam. 0.2--0.4 m; crown irregular, not always conspicuously rounded; winter buds subcylindrical with fine long-tapering scales. On same tree most fascicles 2- but some 3-lvd.; margins entire, little resinous; 3--5.5 cm long, 1.3--1.8 mm wide; lvs. ventrally somewhat glaucous, occasionally non-glaucous, stomatal rows present on all surfaces, though usually fewer on dorsal surface, resin ducts 2--5 with 2's more common in the north; fascicle sheath on younger mature needles slightly to moderately reflexed (usually less than 180°). Seed cones when open 2.5--3.5 cm long, 3--5 cm wide, peduncles 5--8 mm long; apophyses when dry ochre to reddish brown and only slightly raised, umbos recessed, less than half width of apophyses; cones fragile, distal portions of apophyses curling inward leaving sharply pointed scales, seed shells paper thin (0.1--0.3 mm), 450--1650 m, w. Tex., Coah., e. Chih., w. N.L.

7. P. EDULIS Engelm. [P. cembroides var. edulis (Engelm.) Voss]. ROCKY MOUNTAIN PINYON. Tree 6--15 m tall; trunk diam. 0.2--0.8 m; crown compact, irregularly rounded; branches stiff; winter buds ovoid with coarse, broadly deltoid scales. On same tree fascicles mostly 2-lvd., occasionally few 1-lvd., and/or 3-lvd.; lvs. dark green dorsally, ventrally glaucous, margins entire, resinous, 3--6 cm long, mid-fascicle width usually greater than 1.7 mm, smaller when singled-needled, fascicle axis usually curved through 25° or more. Seed cones when newly open pale brown to greenish tan, globose or subglobose, base flattened, with axis 3-- 6 cm long, 4--7 cm wide, with relatively few scales, apophyses protruding, raised at center, umbo slightly depressed at center tending to conceal minute prickle; peduncle length shorter than 3 mm; seeds wingless, moderately thick-shelled, 1.4 cm long, not esp. pointed at proximal end, medium brown. 2 vars., both in CDR.

7a. P. edulis var. edulis. Most or almost all fascicles 2-lvd.; lvs. rather stout, resinous, stomatal rows present on all surfaces but usually fewer on dorsal surface, resin ducts 2 (--1). 1500--3100 m., Colo., e. Ut., N.M., Ariz., w. Tex.; barely entering CDR near the trees' s. limits in s. N.M. and w. Tex. Common nut-pine of the sw. U.S., seeds much used as food.

7b. P. edulis var. fallax Little, ARIZONA ONE-NEEDLE PINYON. Most fascicles 1-lvd., on same tree a few 2-lvd, little resinous, resin ducts 2--8, 1100--1700 m., sw Ut.; nw., cen. and se. Ariz.; sw. N.M., known from CDR only in the Florida, Summit, and Big Burro Mts., N.M. Further study is needed of this taxon and its relationship to P. monophylla Torr. & Frém., the one-needle pinyon of the Great Basin.

8. P. NELSONII Shaw. PINON PRIETO. Tree 5--9 m tall; trunk diam. 0.2--0.4 m; often with multiple very straight stems; branches ca. flexible; winter buds subcylindric with long, tapering, fine scales. Fascicles 3-lvd. but connate, thus appearing 1-lvd., dark green, 4--9 cm long; stomatal lines on all surfaces; resin ducts 1--2; fascicle sheaths persistent (unique in subgenus Strobus). Individual leaves with serrulate margins, a character unique in the pinyons. Cones often in pairs; seed cones when young greenish yellow with protuberant apophyses and purplish unarmed dorsal umbos, almost non-resinous; seed cones when open subcylindric, 8--14 cm long, dark reddish brown; protuberant apophyses highly reflexed; peduncles scaly and extremely long and stout, emerging from branchlet, which is usually less thick, at right angle, but curving backward through nearly 90°, 4--6 cm long, 6--10 mm thick. Seeds ca. 1.5 cm long, wingless, dark chocolate-brown. Very distinctive, rare and local pinyon found on mt. slopes, ca. 1900--2500 m, Coah., N. L., Tam. and S.L.P.

Subgenus Pinus

9. P. TEOCOTE Schlecht. & Cham. Tree 10--30 m tall; trunk diam. 0.4--0.9 m; cylindric-conical when young, usually with single stem; branches slender to thick, young branchlets with glaucous bloom turning reddish brown with age. Fascicles mainly 3-lvd., but occasionally some 2- and 4-lvd. fascicles; lvs. bright green, slender, margins serrulate, 8--14 cm long. Seed cones when nearly ripe ovoid-conical, medium brown, 4--6 cm long, 2--3 cm wide; when open 3--5 cm wide, non-resinous, with small, usually deciduous prickles; peduncles 0.6--1.8 cm long, 4--6 mm thick. Seeds mottled, ca. black, ca. 5 mm long, wing ca. 15 mm long. Usually found among other pines at mesic mt. sites, 1500--3000 m, Chih., Coah., se. to Guat.

10. P. ENGELMANNII Carr. [P. macrophylla Engelm.; P. ponderosa var. macrophylla Shaw; P. apachea Lemm.; P. latifolia Sarg.]. APACHE PINE, PINO REAL. Large tree 15--35 m tall; trunk diam. 0.6--1 m;

single stems often clear; branches stiff, exceptionally thick even at tips. Most fascicles 3-lvd., 3--3.5 mm thick, retained only 2 yrs. resulting in prominently clumped appearance at branch ends; lvs. dark green, serrulate, 25--45 cm long, seed cones when nearly ripe ca. asymmetrical, often clustered, pale yellowish brown, 12--18 cm long, 5--7 cm wide; when open hard and durable, 8--10 cm wide scales chocolate-brown on inner surface, dark brown almost black beneath; apophyses highly reflexed, yellow brown, subconical, protuberant, armed with a strong persistent prickle 1.5 mm long tending to point inward; cones sessile; a few basal scales persistent on branch after cone fall; seeds dark brown, 6--8 mm long, wings 20--30 mm long. Seedlings exhibit a conspicuous "grass" stage. At mesic sites in lower mts., 2100--2400 m, s. Ariz. and s. N.M., s. to Zac. and Aguasc., perhaps barely entering CDR in e. Dgo.

11. P. PONDEROSA Laws. [P. brachyptera Engelm.]. PONDEROSA PINE, WESTERN YELLOW PINE. Usually large trees 10-70 m tall; trunk diam. 0.3--2 m; single stems massive, straight; crown open, rounded; branches stiff, moderately thick even at tips, often turning up at tips; bark blackish and furrowed on younger trees, turning with age to large irregular thick plates becoming orange-yellow. Fascicles nearly all 3-lvd. to nearly all 2-lvd; lvs. yellowish green to dark ca. grayish green, thick, serrulate, 10--25 cm long, retained 4--6 yrs, but often appearing as brush-like clumps at end of bare branches; base of fascicles 1.5--2.5 mm thick; resin ducts 2--6 per needle. Seed cones when nearly ripe ovoid-conical, often in clusters of 2--3, greenish-brown to ochre, 5--12 cm long, 3--6 cm wide, when open 4--10 cm wide, scales pale brown above, dark purplish brown beneath; apophyses protuberant, ca. reflexed, armed with strong persistent prickles 1.5--2 mm long tending to point outward; prickles on upper scales even curving upward; cones sessile; a few basal scales persistent on branch after cone fall; seeds 6--8 mm long, dark brown, almost black, articulate wings 15--25 mm long. Perhaps the most widespread pine in N.A., and the most important economically, B.C., Mont., N.D., s. to Colo., Ariz., N.M. and w. Tex.; n. Son., and n. Chih., 0--3100 m, 2 vars.: var. ponderosa, B.C., Mont., s. to Calif., and:

11a. P. ponderosa var. scopulorum Engelm. [P. scopulorum Lemm.; P. ponderosa subsp. scopulorum (Wats.) Weber]. Tree 10--35 m tall; trunk diam. 0.3--1.2 m. Fascicles on same tree 3--2 lvd., often almost all 2-lvd.; lvs. dark green, 10--18 cm long. Seed cones 5--9 cm long, 4--7 cm wide when open; seeds 6 mm long, wings 17 mm long. 1500--3100 m, cen. Mont. to s. Ariz., N.M., w. Tex., possibly in n. Son. and n. Chih.

12. P. ARIZONICA Engelm. [P. ponderosa var. arizonica Shaw]. Tree 10--35 m tall; trunk diam. 0.3--1.2 m; single stems massive, straight; crown open, somewhat rounded; branches stiff, often turning up at tips; bark blackish and furrowed on younger trees,

turning with age to large irregular thick plates parting on surface into thin closely appressed pale cinammon-red scales. Fascicles on same tree 5-, 4- and 3-lvd.; lvs. medium to dark green, moderately thin, serrulate, 10--30 cm long; needles retained 3 yrs., but often as brush-like clumps at ends of bare branches; resin ducts 4--10 per needle. Seed cones when nearly ripe ovoid-conical, often in clusters of 2--3, greenish brown to ochre, 5--14 cm long, 3--6 cm wide; when open 4--10 cm wide, scales pale brown above, much darker beneath; apophyses moderately protuberant, somewhat reflexed, armed with rather fine reflexed prickles not always persistent, ca. 1 mm long and tending to point downward; peduncles short, very thick; seeds 7--9 mm long, dark brown almost black; articulate wings 15--30 mm long. Se. Ariz., sw. N.M., Son., Chih., Coah., Dgo., Tam., N.L. and possibly Zac., 1300-3000 m. 2 vars., both in our area.

12a. P. arizonica var. arizonica. Lvs. rather fine; fascicles commonly 5-lvd. in N. but with an increasing frequency of 3- and 4-lvs. in Coah., 10-16 cm long, at base 1--1.5 mm thick; resin ducts 5--10 per needle. Seed cones 5--9 cm long, when open 4--7 cm wide; peduncles generally hidden by basal scales of open cones, remaining on tree with few basal scales when cones fall. Se. Ariz., sw. N.M., Son., Chih., Coah., and Dgo., 1600--3000 m. A variable taxon readily distinguished from P. ponderosa var. scopulorum in se. Ariz., and sw. N.M. by its more slender needles, usually in fascicles of 5, thin glaucous twigs. and smaller cones with less prominent prickles. In Coah., distinctions are less clear as needles are mainly in fascicles of 3 and twigs not always glaucous.

12b. P. arizonica var. stormiae Martínez. Fascicles varying from mainly 3-lvd. in N. to mainly 5-lvd. in S., ca. 17--30 cm long, at base 1.5--2 mm thick; lvs. rather coarse with 3--8 resin ducts. Seed cones 8--14 cm long, when open 6--10 cm wide, medium to pale brown; peduncles short and thick but sufficiently long to remain visible when cone is open, not sessile, fallen cones sometimes complete. A rather local, but distinct taxon, Chisos Mts., Tex.; Coah., N.L. and Tam., 1300--2300 m. This taxon differs sufficiently from P. ponderosa var. scopulorum and from P. arizonica var. arizonica to warrant further careful study.

13. P. LEIOPHYLLA Schlecht. & Cham. Tree 15--35 m tall; trunk diam. 0.3--1 m; single stems ca. irregular; crown rather open, rounded; branches irregular, somewhat pendent in older trees; branch tips ca. 0.5 cm thick, flexible; bark on older trees nearly black, thick, deeply and irregularly fissured, often exhibiting many epicormic (adventitious) shoots. Lvs. fine, bluish green, ca. glaucous, serrulate, 6--15 cm long; fascicles on same tree 5--4--3 lvd., with sheaths deciduous (unique to subsect. Leiophyllae in the subgenus Pinus). Seed cones when nearly ripe ovoid-conical, numerous on fine branches, 4--8 cm long, 2--3.5 cm wide, yellow-brown turning gray, when open 4--6 cm wide; apophyses ca. flat, armed

with inconspicuous, weak prickles; conspicuous peduncles ca. 1 cm long; cones requiring 3 yrs to ripen (unique in CDR) and persistent for many years; seeds ca. 0.5 cm long with wings 1.7 cm long, brown. Cen. Ariz., sw. N.M., se. to Oax. 1500--3700 m., 2 vars.: var. leiophylla, Chih. s. to Oax., and:

13a. P. leiophylla var. chihuahuana (Engelm.) Shaw [P. chihuahuana Engelm.]. CHIHUAHUA PINE. Small tree 15--25 m tall; trunk diam. 0.3--0.6 m. Fascicles usually 3-lvd. but occasionally more, 6--10 cm long. 1600-2500 m. Cen. Ariz., sw. N.M., s. to Dgo., barely entering CDR in nw. corner.

II. ABIES Mill. FIR, OYAMEL

1. A. DURANGENSIS Martínez. Tree 20--40 m tall; trunk diam. 0.4--1 m; twigs reddish brown, finely hairy to smooth. Lvs. 1--4 cm long with rounded to acute tips; sometimes emarginate; stomata on both surfaces. Seed cones pale to medium brown, cylindrical or long-ovoid, 5.5--10 cm. long, 3.5--4 cm wide; bracts not exserted. 2000-2900 m. 2 vars.: var. durangensis, S.M. Occ. in Chih. and Dgo.; and:

1a. A. durangensis var. coahuilensis (I.M. Johnst.) Martínez. [A. coahuilensis I. M. Johnst.]. COAHUILA FIR, GUAYAME BLANCO. Tree 20--30 m tall; trunk diam. 0.4--0.9 m. A poorly defined and probably rare var. separable from var. durangensis by vegetative chars. such as shorter lvs. 1--2.5 cm long, a thicker hypoderm along midrib of underside of needle, and with 2 halves of double fibrovascular bundle contiguous. We have not been able to confirm some additional differences mentioned by Martínez, such as hairiness of twigs and stomatal frequency on upper surface of needles. In CDR known only from Sa. de la Madera and Sa. Maderas del Carmen, Coah., 2100--2600 m; also found at Rincón de María and in Serranías del Burro, Coah. just outside CDR.

III. PSEUDOTSUGA Carr. DOUGLAS-FIR

1. P. MENZIESII (Mirb.) Franco [P. taxifolia (Lamb.) Britt.]. Large tree 20--75 m tall, trunk diam. 0.5--3 m, twigs dark brown to reddish, finely hairy at first. Lvs. 1.5--3.5 cm long, with usually blunt, but sometimes acute and rarely even attenuate tips. Seed cones when nearly ripe dark purplish brown with straw-colored bracts, 3--10 cm long, 1.5--5 cm wide. 0--3300 m. 2 vars.: var. menziesii, B.C. s. to Calif., and:

1a. P. menziesii var. glauca (Beissn.) Franco. ROCKY MOUNTAIN DOUGLAS-FIR, GUAYAME COLORADO. Tree 20--40 m tall; trunk diam. 0.5--1.5 m. Lvs. 1.5--2.5 cm long. Cones 3--7 cm long. Common in higher mesic mts. in CDR, 1800--3300 m. B.C., Alta. se. to Pue. Based upon work of Mlle. Flous, Martínez (1963) recognized several spp. in Mex. which, pending further study, we have included in this taxon.

LITERATURE CITED

- Bailey, D. K., and F. G. Hawksworth. 1979. Pinyons of the Chihuahuan Desert Region. *Phytologia* 44:129-133.
- Bailey, D. K., and T. Wendt. 1979. New pinyon records for northern Mexico. *Southwest. Natural.* 24:389-390.
- Johnston, M. C. 1977. Brief resume of botanical, including vegetational, features of the Chihuahuan Desert Region with special emphasis on their uniqueness. P. 335-359, IN, Transactions of the symposium of the biological resources of the Chihuahuan Desert Region, United States and Mexico, (R. W. Wauer and D. H. Riskind, Eds.), U. S. Dept. Interior, National Park Service Transactions and Proceedings Series No. 3.
- Martínez, M. 1948. *Los Pinos Mexicanos*, Ed. 2, 361 p. Univ. Nac. Autonoma de Mex., Mexico City.
- Martínez, M. 1963. *Las Pinaceas Mexicanas.*, Ed. 3, 401 p., Univ. Nac. Autonoma de Mex., Mexico City.
- Robert, M.-F. 1978. Un nouveau pin pignon Mexicain: *Pinus johannis* M.-F. Robert. *Adansonia*, Ser. 2, 18:365-373.
- Robert-Passini, M.-F. 1981. Deux nouveaux pins pignons de Mexique. *Bull. Mus. Natn. Hist. Nat. Paris.* 4e Ser., 3, Sect. B, *Adansonia* 1:61-73.